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NUMBER 11-8-60

SOVIET CAPABILITIES FOR LONG
RANGE ATTACK THROUGH MID-1965

Submitted by the
DIRECTOR OF CENTRAL INTELLIGENCE

The following intelligence organizations participated in the preparation of this estimate: The Central Intelligence Agency and the intelligence organizations of the Departments of State, the Army, the Navy, the Air Force, The Joint Staff, and NSA.

Concurred in by the
UNITED STATES INTELLIGENCE BOARD

on 1 August 1960. Concurring were the Director of Intelligence and Research, Department of State; the Assistant Chief of Staff for Intelligence, Department of the Army; the Assistant Chief of Naval Operations for Intelligence, Department of the Navy; the Assistant Chief of Staff, Intelligence, USAF; the Director for Intelligence, The Joint Staff; the Assistant to the Secretary of Defense, Special Operations; the Director of the National Security Agency; and the Atomic Energy Commission Representative to the USIB. The Assistant Director, Federal Bureau of Investigation, abstained, the subject being outside of his jurisdiction.*

* This estimate was approved by the USIB on 19 July 1960 subject to certain further action by USIB representatives (consulting as necessary with their respective principals). (USIB-M-108, Item 8.) Since this latter action was completed on 1 August 1960, NIE 11-8-60 should be considered finally approved by USIB as of that date. (USIB-M-114 Item 1.)

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CIA HISTORICAL-REVIEW PROGRAM

SOVIET CAPABILITIES FOR LONG RANGE ATTACK THROUGH MID-1965

THE PROBLEM

To estimate probable trends in the strength and deployment of Soviet air and missile weapon systems suitable for long range attack, through mid-1965. The weapon systems considered are heavy and medium bombers, related air-to-surface missiles, ground-launched missiles with ranges of 700 nautical miles or more, and submarine-launched missiles.

CONCLUSIONS

1. Since the adoption of NIE 11-8-59, "Soviet Capabilities for Strategic Attack Through Mid-1964," dated 9 February 1960, we have made an extensive re-examination of all available evidence bearing on Soviet production and deployment of ICBMs. The conclusions resulting from this re-examination are, in brief (*Paras. 13-14*):

a. Soviet series production of ICBMs probably began in early 1959, but we have no direct evidence of the present or planned future rate of production.^{1 2}

¹ Series production means production of missiles of like type in accordance with a planned buildup rate. The date of commencement of series production is defined as the date of completion of the first missile in the series.

² The Assistant Chief of Staff for Intelligence, Department of the Army, believes that there is no evidence to indicate that ICBMs have been produced in the Soviet Union in numbers larger than are required by the continuing R & D activities. He therefore believes that this conclusion is misleading in that it may be interpreted to imply that ICBMs for operational deployment or inventory started to become available in 1959. See his footnote to paragraph 13 a.

b. As yet, we can identify no ICBM-related troop training activities, nor can we positively identify any operational launching site, as distinguished from the known test range facilities.

c. We still estimate a Soviet initial ICBM operational capability with a few—say 10—series produced missiles as of 1 January 1960.^{3 4}

2. Since there is insufficient direct evidence to establish the scale and pace of

³ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that as of 1 January 1960 the Soviets had only an emergency capability to launch a few ICBMs against North America. These ICBMs probably would have had to have been launched from R & D facilities. However, he believes that, for planning purposes, it is prudent to assume that the IOC had occurred by 1 January 1960.

⁴ The Assistant Chief of Naval Operations for Intelligence, Department of the Navy, believes that there is insufficient information to judge that, as of 1 January 1960, the conditions for IOC (that is, the date at which a few—say 10—series produced ICBMs could have been placed in the hands of one or more trained units at existing launching facilities) had been met.

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the present Soviet ICBM production and deployment program,⁵ we have based our estimate in part on various indirect forms of evidence and on argument and analysis deduced from more general considerations. These latter include such things as the strategic ideas which appear to govern Soviet military policy, our appreciation of the strategic capabilities which Soviet military planners might expect to derive from given numbers of ICBMs, our general knowledge of Soviet military production practices, and our sense of the tempo at which the present program is being conducted. (Para. 15)

3. The Soviets have strong incentives to build a substantial ICBM force. The ICBM provides them for the first time with an efficient means of delivering a heavy weight of attack on the US. What we know of Soviet strategic ideas suggests that the ICBM is thought of primarily in terms of deterrence, and of pre-emptive or retaliatory attack should deterrence fail, rather than primarily in terms of the deliberate initiation of general war. These terms, however, provide

⁵ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that the direct evidence upon which to base an estimate of present Soviet ICBM strength is of major significance. He believes that much of this evidence constitutes negative indications and, therefore, that its rejection as insufficient leads to unrealistic overestimation. See his footnote to paragraph 15.

⁶ The Assistant Chief of Staff, Intelligence, USAF, does not concur in Conclusions 3 and 4. He believes that Soviet military doctrine, history, and behavior warrant the judgment that the USSR will strive to achieve a capability for decision which has as its basis the exploitation or application of military force, and he does not believe that the Soviets would be content with conceptual levels of pre-emptive attack and deterrence. Thus, he believes that the Soviet rulers would

no quantitative definition of Soviet ICBM force goals.⁶ (Paras. 16-23, 29)

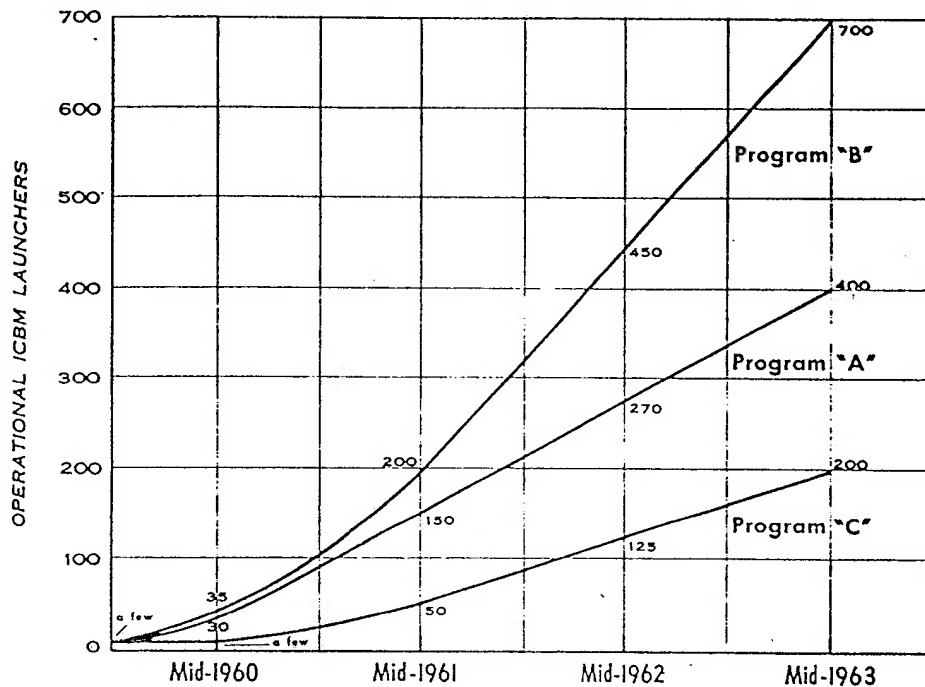
4. As an approach to an appreciation of Soviet ICBM requirements, we have computed the numbers of Soviet ICBMs on launchers theoretically required for an initial salvo designed to inflict severe damage on SAC bomber bases and other installations directly related to immediate US nuclear retaliatory capabilities. Uncertainty regarding the inputs, and the sensitivity of the computations to variations in the assumptions made with respect to them, render the numerical results too various to provide a reliable basis for estimating Soviet ICBM force goals. Moreover, regardless of the results of any corresponding Soviet calculations, there are operational factors (such as Soviet problems in achieving simultaneity of salvo, and the mobility of US retaliatory forces) which would tend to reduce their confidence in their ability, with any given number of ICBMs, to destroy or neutralize US retaliatory forces through attack on fixed installations such as bomber bases.^{6 7} (Paras. 24-29, including footnotes to para. 28b, and Annex A)

endeavor to achieve a military superiority over the US and would direct Soviet planners to assess those military requirements which would enable them either to force their will on the US through threat of destruction or to launch such a devastating attack that the US as a world power would cease to exist.

⁷ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that operational considerations which extend beyond the computations of the number of ICBMs required to inflict severe damage on certain static targets would prohibit Soviet military planners from accepting with confidence any calculation that a certain number of ICBMs would be sufficient, in conjunction with the operations of other Soviet forces, to reduce the weight of a US retaliatory attack to an acceptable level. See his footnote to paragraph 29.

5. We have also examined the tasks and problems involved in the production and deployment of ICBMs through the elaboration of three illustrative Soviet programs. They represent the range of judgments, based on the direct and indirect evidence available to us, regarding

the scale and tempo of Soviet effort. These illustrative programs are summarized, in the chart below, in terms of the numbers of operational ICBM launchers^a which each would provide. (*Paras. 30-42, and Annex B*)



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6. With reference to the illustrative programs presented above, the members of the United States Intelligence Board have concluded as follows (*Para. 43*):^o

a. The Director of Central Intelligence considers that program "A" should be re-

^a The number of launchers is a good measure of the amount of activity involved in a given ICBM program, since it includes all of the facilities, in addition to the missiles themselves, which are necessary to the operational weapon system. Included are ground guidance facilities; test, check-out, and maintenance equipment; fuelling and storage facilities; and housing and general purpose equipment.

garded as the nearest approximation of the actual Soviet program.

b. The Assistant Chief of Staff, Intelligence, *USAF*, believes that program "B" approximates the most likely Soviet program.

c. The Director of Intelligence and Research, Department of *State*, the Assistant to the Secretary of *Defense*, Special Operations, and the Director for Intelligence, *The Joint Staff*, believe that through 1961 the Soviet program is likely

^o For a more extended expression of some of these views, see footnotes to paragraph 43.

to fall towards the high side of the range defined by illustrative programs "A" and "B," and, in the light of factors discussed in paragraph 8, they consider that in the 1962-1963 period it will continue to grow within the "A"- "B" range.

d. The Assistant Chief of Staff for Intelligence, Department of the *Army*, and the Assistant Chief of Naval Operations for Intelligence, Department of the *Navy*, believe that illustrative program "C" most nearly approximates the actual Soviet program.

7. It is notable that the potential threat posed by programs "A" and "B" is substantially the same through 1960. Before the end of the year, either would provide a capability to inflict massive destruction on the principal US metropolitan areas. At the beginning of 1961, either would provide sufficient ICBMs and launchers to threaten the SAC operational air base system. Thereafter, the threat posed by program "B" would increase more rapidly than that of program "A." By about mid-1961, program "B" would provide Soviet planners with a high assurance of being able to severely damage most of the SAC air base system in an initial salvo, whereas program "A" would reach this point late in the year. The considerably smaller program "C" would provide a capability to inflict massive destruction on the principal US metropolitan areas sometime in 1961. (Para. 44)

8. The present Soviet ICBM program is, of course, subject to change as the period progresses. Soviet planning for the period beyond 1961 will be substantially affected by the actual development of US retaliatory forces, the prospects for a greatly improved Soviet ICBM, and the

prospects, on each side, for an effective defense against ICBMs, as well as the general development of the world situation and of relations between the US and the USSR. Our estimates for future years must be reviewed in the light of such developments and of such additional evidence as we may obtain regarding the actual progress of the Soviet program. They must therefore be regarded as highly tentative. For these reasons, we have not projected even a tentative estimate beyond 1963.¹⁰ (Para. 45)

9. We continue to estimate that with relatively modest programs in 700 and 1,100 n.m. ballistic missiles the Soviets will acquire, by 1960 or 1961, a force of medium range missiles capable of seriously threatening the major Western landbased retaliatory targets within their range. (Paras. 46-51)

10. We estimate that the USSR now has a limited capability to launch ballistic missiles from about a dozen long range, conventionally-powered submarines. The Soviets will probably increase this force gradually over the next year or two, and then introduce a weapon system capable of delivering ballistic missiles against land targets from a submerged nuclear-powered submarine. While we believe the Soviets would employ submarine-launched missiles against selected US targets, their planning does not appear to contemplate delivery of the main weight of an attack by this means. (Paras. 65-70)

¹⁰ The Assistant Chief of Staff, Intelligence, USAF, believes that, despite the difficulties engendered by consideration of the factors enumerated, an estimate beyond 1963 can be made. He believes that, lacking contradictory information, the rates of increase shown in program "B" should be continued through 1965.

11. The announced Soviet force reductions will probably bring some reduction in Long Range Aviation strength, but in 1965 the USSR will probably still retain a substantial bomber force. Even after a formidable ICBM capability has been established, the USSR will require long range bombers for a variety of purposes, including attacks on difficult land targets, reconnaissance, and operations against carrier task forces at sea. Air-to-surface missiles will be available in increasing quantity. The Soviets will probably in-

troduce a new medium bomber capable of supersonic "dash," and we estimate that they are developing a long range, supersonic cruise-type vehicle, but BISONs and BADGERs will remain the most numerous of Soviet long range aerodynamic delivery vehicles. (Paras. 52-64)

12. Our numerical estimates of Soviet heavy and medium bombers in Long Range Aviation, medium range ballistic missiles, and missile-launching submarines are set forth in the following table:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963	Mid-1964	Mid-1965
Bombers and Tankers ¹¹						
Heavy	135	150	140	130	120	100
Medium ^a	1,100	950	800	800	800	750
Ballistic Missiles						
700 n.m.						
Operational Inventory	250	350	450	450	450	450
Launchers ¹²	110	150	150	150	150	150
1,100 n.m.						
Operational Inventory	80	160	240	300	300	300
Launchers ¹²	50	100	100	100	100	100
Missile Submarines						
"Z" Class ^b	4	4	4	4	4	4
"G" Class ^c	9	14	18	18	18	18
Nuclear ^d	0	0	2	6	10	14

^a Probably including a few new supersonic "dash" bombers in 1961, building up to perhaps 100 by 1963-1964.

^b Each "Z" class submarine would probably carry two missiles.

^c Each "G" class submarine would probably carry about six missiles.

^d Each nuclear-powered submarine would probably carry 6-12 missiles.

¹¹ The Assistant Chief of Staff, Intelligence, USAF, believes that the numbers of bombers and tankers, should read:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963	Mid-1964	Mid-1965
Bombers and Tankers						
Heavy	135	150	175	200	200	200
Medium [*]	1,100	1,000	950	900	800	800

^{*} Probably including a few new supersonic "dash" bombers in 1961, building up to some 300 in mid-1965.

¹² The Assistant Chief of Staff, Intelligence, USAF, believes that each operational missile would be provided with a launcher.

DISCUSSION

I. INTERCONTINENTAL BALLISTIC MISSILES

13. In the five months since the adoption of NIE 11-8-59 we have gained some new evidence and have made an extensive re-examination of all available evidence bearing on the Soviet production and deployment of ICBMs. The conclusions resulting from this re-examination are, in brief:

a. Soviet series production of ICBMs probably began early in 1959. The increased availability of ICBMs has been reflected in an increased rate of firings at the ICBM test range.^{13 14}

b. We have no direct evidence of the present or planned future rate of Soviet ICBM production.

c. As yet, we have not identified any ICBM-related troop training activities.

d. As yet, we have not positively identified any operational ICBM unit or launching facility in the USSR, as distinguished from the known test range facilities.

¹³ Series production means production of missiles of like type in accordance with a planned buildup rate. The date of commencement of series production is defined as the date of completion of the first missile in the series.

¹⁴ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that this conclusion is misleading in that it is used in this estimate as a basis for the construction of illustrative ICBM deployment programs largely based on assumed rates of missile production. There is no evidence to indicate that ICBMs have been produced in the Soviet Union in numbers larger than are required by the continuing research and development activities. He does not believe that the moderate increase in test firings justifies the implication that ICBMs for operational deployment or inventory started to become available in 1959.

In any case, he agrees with the judgments expressed implicitly in paragraph 14 that the production of missiles is not the critical factor in the establishment of an operational capability, and he believes that estimates of operational ICBM capabilities which are based primarily on such noncritical factors as an estimated date of initiation of series production and the IOC date arrived at for planning purposes are unrealistic and dangerously misleading.

14. If, as we estimate, Soviet series production of ICBMs began early in 1959, delivery of series produced missiles to operational units could have been underway during the latter part of that year. In the establishment of an operational capability, however, the critical factors are the training of troops and the provision of operational launching facilities. Some troop training could have been accomplished at the ICBM test range. It is unlikely, however, that a major training program could or would be conducted on the research and development facilities there. [

] Our inability, as yet, to identify any operational ICBM launching facilities in the USSR does not prove that none exists. The evidence neither confirms nor denies our estimate in NIE 11-8-59, but it does put in question whether launching facilities are now being established at a rate commensurate with that estimate. We continue to estimate a Soviet initial ICBM operational capability with a few—say 10—series produced missiles as of 1 January 1960.^{15 16}

15. Since there is insufficient direct evidence to establish the scale and pace of the present Soviet ICBM production and deployment pro-

¹⁵ The Assistant Chief of Naval Operations for Intelligence, Department of the Navy, believes that there is insufficient information to judge that as of 1 January 1960 the conditions for IOC (that is, the date at which a few—say 10—series produced ICBMs could have been placed in the hands of one or more trained units at existing launching facilities) had been met.

¹⁶ The Assistant Chief of Staff for Intelligence, Department of the Army, wishes to restate his position with respect to the Soviet ICBM IOC date. He believes that as of 1 January 1960 the Soviets had an emergency capability to launch a few ICBMs against North America, but that these ICBMs probably would have had to have been launched from R & D facilities. However, he believes that for planning purposes, it is prudent to assume that the IOC had occurred by 1 January 1960.

gram,¹⁷ we have based our estimate in part on various indirect forms of evidence and on argument and analysis proceeding by deduction from more general considerations. These latter include such things as the strategic ideas which appear to govern Soviet military policy, our appreciation of the strategic capabilities which Soviet military planners might expect to derive from given numbers of ICBMs, our general knowledge of Soviet military production practices, and our sense of the tempo at which the ICBM program is being conducted.

Soviet Strategic Ideas and the ICBM ¹⁸

16. Soviet strategic thinking and the Soviet leaders' sense of the relative balance of military power in the world have undergone profound changes over the last decade or so. The development of revolutionary new weapons systems in the period after World War II has been a strongly stimulating factor in this process. It probably hastened the rethinking of the Soviet strategic position and strategic doctrine, once Stalin's death made it possible

¹⁷ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that the direct evidence upon which to base an estimate of present Soviet ICBM strength is of major significance. He believes that the voluminous amounts of information from all sources on the deployment phase of the Soviet ICBM program is of such breadth and depth that comparable information would be given great weight, if not considered nearly conclusive, in making intelligence estimates on other subjects. He also believes that the rejection of this significant amount of intelligence as "insufficient" appears deceptively valid, since much of the evidence constitutes essentially negative indications. Such a rejection removes from the problem of estimating Soviet ICBM capabilities the restrictions imposed by this evidence and permits theoretical speculations leading to unrealistic overestimation.

¹⁸ The Assistant Chief of Staff, Intelligence, USAF, believes that Section I of NIE 11-8-59, which was concurred in less than six months ago, provides more cogent, comprehensive, and useful reflection of Soviet thinking regarding the development of strategic attack capabilities and broad considerations affecting the future composition of Soviet strategic attack forces than does *Soviet Strategic Ideas and the ICBM* in NIE 11-8-60. For his views see his footnote to Conclusions 3 and 4.

to set aside the authoritative personal views of the dictator, views which were largely a rationalization of his conduct of the war against Germany and which were increasingly irrelevant. The new ideas which then came into play clearly form the background of military thinking against which Soviet decisions about an ICBM program have been considered in the last several years.

17. Fundamental to the new thinking was a full recognition, long since prevalent in the military policies of other nations, of the great importance of capabilities for long range attack. Soviet pronouncements and actual military programs, although continuing to reflect a balanced force concept, now give the greatest emphasis to Soviet long range attack capabilities and defenses against such Western capabilities. Weapon systems for these purposes have evidently had first claim on research and development efforts for some years.

18. Soviet doctrine has also recognized the great importance, under modern conditions, of striking the first strategic blow. In discussion of the problems of surprise and of preemptive attack,¹⁹ Soviet theorists have indicated their recognition that the side which achieves the first blow acquires immense advantage. Although they have denied that a surprise attack could decide a war between major powers at one blow, they have said that it could create conditions for a successful prosecution of the war by the side achieving it. They acknowledge that, even with surprise attack, the aggressor will himself receive very severe damage. While much in Soviet doctrinal discussion on this point necessarily remains obscure, there is no suggestion in what we know of Soviet thinking that the Soviets have concluded that possession of long range missiles would permit them to attack the US with assurance of victory at an acceptable cost.

19. On the other hand, the Soviets apparently do have a very considerable confidence that their ICBM program can impose a high de-

¹⁹ That is, an attack with immediately available forces, designed to seize the strategic initiative from an enemy who is himself preparing imminently to attack.

gree of deterrence on US resort to attack on the USSR. Their conduct increasingly indicates their belief that, except for the most crucial stakes, the US will not seriously consider an attack on the USSR or even run very high risk that a local issue could eventuate in general war.²⁰

20. This idea has evidently been a very intoxicating one for the Soviet leaders. It gives them a sense of equality in power and a greater confidence in their eventual world triumph than they had ever before felt in all the 40-odd years during which they have considered their regime to be engaged in unremitting struggle against the hostile outside world. But achieving what they consider to be equality in military power has apparently not led them to conclude that their cause must triumph by the use of military power. On the contrary, it has strengthened their belief that communism can win by other means. They reason that the natural movement of political forces will increase the number of communism's adherents in the world and that this process, together with their ability to deter resort to war by the greatest

²⁰ The Director for Intelligence, The Joint Staff, does not concur in paragraphs 19 through 23. He believes that although Soviet public statements appear to indicate increasing satisfaction with their military power, it does not follow that these statements—considered in light of Soviet propaganda practices—necessarily signify that Kremlin leaders truly possess "very considerable confidence that their ICBM program can impose a high degree of deterrence on" the US, or that they have achieved "what they consider to be equality in military power." In his opinion the Soviet rulers are aware that "deterrence" of the US from initiating an attack on the USSR has, for fourteen years, been the result of the self-imposed moral restraint underlying US national policy. He believes that in the Soviet view the more aggressive the USSR is in applying political or psychological pressures (including the threat of limited war), the greater will be the risk of a US military reaction. Consequently, he considers that in Soviet eyes the security of the Soviet state requires attainment of maximum feasible capability to destroy US nuclear attack forces prior to the USSR embarking on a more adventurous course than heretofore or prior to their investing in a "still higher premium upon other forms of struggle."

imperialist power, will hasten the triumph of their cause.

21. Practiced as they are in the systematic exploitation of political and military assets through the whole range of political warfare tactics, the Soviets have recognized the unique possibilities for them in their claim to have an advantage in so formidable a weapon as the ICBM. Since their first ICBM firing in 1957 they have sought to maximize use of the ICBM as an instrument of political pressure. They have magnified their missile capabilities in propaganda and have been increasingly disposed to intervene in critical situations with pressures and threats.

22. At the same time, however, the Soviet leaders have given every indication of realizing that the actual waging of a great war with nuclear weapons and modern delivery systems would constitute an immeasurable disaster for them. They apparently recognize that such a war could nullify the whole enormous effort they have made to construct a modern industrial society in Russia. The availability of nuclear weapons has introduced into war incalculable factors to which they are particularly sensitive because they believe in a rational conduct of policy directed to chosen political ends. They regard war itself as an instrument of policy which must always be subordinated to such political objectives. They give strong signs of believing that, while the possession of a substantial ICBM capability is of the highest importance for political warfare and for redressing the balance of military power, it is not a capability which would warrant a war deliberately planned to achieve rational ends of policy. This consideration would not preclude Soviet resort to general war in circumstances in which they considered that to be the only means whereby they could defend a vital national interest.

23. In sum, what we know of Soviet ideas suggests that the ICBM capability is thought of primarily in terms of deterrence, and of pre-emptive or retaliatory attack should deterrence fail, rather than primarily in terms of the deliberate initiation of general war. The implication which is clearest is that the Soviets have concluded that the possession

of ICBM capabilities by both sides puts a still higher premium upon other forms of struggle and that their advantages in this respect are so great as to insure their eventual triumph without resort to general nuclear war. These considerations do not, in themselves, define any particular ICBM force levels which the Soviets think appropriate to their needs. They do provide a useful frame of reference in which other approaches to the problem may be examined.

Theoretical Soviet ICBM Requirements

24. The Soviet authorities would consider that any substantial Soviet ICBM capability would have important psychological and political effects, including a major deterrent effect on the US, and that these effects would tend to increase with the size of the Soviet ICBM force. In terms of military capabilities, however, they would regard the ICBM primarily as a potential means of destroying or neutralizing US long range attack forces. In assessing their capabilities against such US forces, Soviet military planners would of course take into account not only ICBMs, but also their other long range attack forces. They would also take into account their capabilities to attack aircraft carriers and missile-launching submarines at sea and their air defense capabilities. The ICBM, however, would be their most effective weapon for initial attack on targets of known location in the US. In considering such targets, they would take into account the likelihood that, for at least the next few years, the great preponderance of the US megatonnage intended for delivery upon the USSR would be bomber-borne. As long as their ICBM capabilities remain limited, this consideration would tend to concentrate their attack on long range bomber bases. However, they might also be influenced by the fact that they now have some defense against bombers, none against ICBMs in flight.

25. As an approach to an appreciation of the military capabilities which various numbers of Soviet ICBMs might represent, we have computed the numbers of ICBMs on launchers theoretically required for an initial salvo designed to inflict severe damage on SAC bomber bases and other fixed installations directly

related to immediate US nuclear retaliatory capabilities.²¹ The factors employed in these computations, and the results, are set forth in Annex A.

26. These computations provide some sense of proportion with respect to Soviet requirements against various target systems as these systems develop over time. They also illustrate, however, the sensitivity of the results to varying assumptions regarding the composition of the target system, the degree of assurance the Soviets would desire against it, and especially the accuracy and reliability of the Soviet ICBM. Uncertainty regarding the inputs, and the very sensitivity of the computations to the various assumptions made regarding them, render the numerical results too various to provide a reliable basis for estimating Soviet ICBM force goals.

27. Soviet military planners, being less uncertain than we regarding the present and future accuracy and reliability of their ICBM, are capable of making more valid computations of their ICBM requirements. They would also know their own targeting concepts, damage criteria, and desired levels of assurance. The numbers which they might derive from their computations could be substantially greater or less than those we have computed, according to the values actually used by them for these factors.

28. Whatever the numerical results of such Soviet computations, Soviet planners, in determining their ICBM force goals, would have to take into account several additional factors tending to reduce their confidence in their ability, with any given number of ICBMs, to destroy or neutralize US long range attack

²¹ The ICBM weapon system is inherently limited to attack on targets the precise locations of which are known in advance. Consequently, although the primary object of this attack would be to destroy or neutralize bombers and other delivery vehicles, Soviet ICBM capabilities can be analyzed only in terms of attack on bomber bases and other fixed installations. In evaluating the military significance of such capabilities, Soviet planners would have to take into account the mobility and reaction times of the forces that were the true object of the attack. See paragraph 28.

forces through attack on fixed installations such as bomber bases. These include:

a. The mobility of US bomber and naval forces. A Soviet capability to destroy SAC home bases could be considerably offset by the dispersal of aircraft to alternate bases²² or by the maintenance of aircraft on airborne alert. A Soviet capability to destroy naval bases could be similarly offset. Soviet planners would almost certainly expect such evasive countermeasures to be taken in any threatening situation.

b. The improbability of achieving, in the first ICBM salvo in human experience, the simultaneity required to prevent the launching of a significant portion of the US retaliatory forces, considering their fast reaction times.^{23 24 25}

²² SAC's ability to disperse could be countered by targeting all of the airfields capable of supporting SAC aircraft, but this would entail a substantial increase in the Soviet ICBM requirement.

²³ The Assistant Chief of Staff, Intelligence, USAF, believes that the simultaneity required for the ICBM attack is not improbable. If the tactics for employment of the ICBM demand simultaneity, it follows that the Soviets will train their operational units and develop their equipment towards the attainment of that end. Given the equipment postulated by any of the production programs described in this Estimate, simultaneity in these weapons systems does not appear as difficult to obtain as in systems the USSR already possesses.

²⁴ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that it should be emphasized that simultaneity of launch within 15-30 minutes is only an assumption and not an estimate of capability. He believes that no estimate of such capability has been made because the problems involved are so highly complex and valid information on these problems is so scanty. He believes that the minute-to-minute variations in the state of readiness of an individual ICBM on launcher, coupled with the technical exactness required in the simultaneous firing of large numbers of ICBMs would require simplifications in the weapons system not likely to be attained during the period of this estimate.

Accordingly, he believes that the concept of an "engineered," precisely calculated ballistic missile attack, managed by computers with the human element and other uncertainties removed, would be realized by the Soviets to be impractical in the next few years.

c. The increasing proportion of normally untargetable elements likely to be in the US retaliatory force structure as the period progresses: the increasing number of Polaris submarines at sea and the introduction of a mobile Minuteman system.

d. The requirement to coordinate an initial ICBM salvo against US retaliatory force bases beyond the range of Soviet 1,100 n.m. ballistic missiles with the initial operations of other forces involved in the initiation of a general war. Precise coordination would be required in these operations, in order to avoid such a forfeiture of strategic surprise as would frustrate the purpose of the ICBM salvo.

29. Despite these operational considerations, the ICBM provides the USSR, for the first time, with an efficient means of delivering a heavy weight of attack on the US, and the Soviets have strong incentives to build up a substantial force. Such a buildup would be consistent with current Soviet strategic thinking and would support the Soviet claim that the longstanding imbalance between US and Soviet long range attack capabilities had been redressed.²⁶

²⁵ The Director for Intelligence, The Joint Staff, does not concur in paragraph 28 b. He believes the factors it discusses would cause Soviet planners to increase their ICBM force goals, rather than to conclude that no ICBM force, no matter how large, could give a desired degree of assurance. He believes, for example, Soviet planners would compute simultaneity in the same manner other reliability factors are estimated and make allowances for this factor in determining ICBM requirements.

²⁶ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that the operational considerations cited in paragraph 28, which extend beyond the computations of the number of ICBMs required to inflict severe damage on certain static targets, would prohibit Soviet military planners from accepting with confidence any calculation that a certain number of ICBMs would be sufficient, in conjunction with the operations of other Soviet forces, to reduce the weight of a US retaliatory attack to an acceptable level. Further, he believes that the overwhelming magnitude of these theoretical requirements, coupled with the uncertainties inherent in their calculations, would combine to

Footnote continues on next page.

Illustrative Production and Deployment Programs

30. In building substantial operational capabilities with ICBMs, the Soviets must achieve a high order of planning and accomplishment in the production of missiles, establishment of launching facilities, provision of logistic support, and training and activation of operational units. The last three of these types of activity, particularly the establishment of launching facilities, are likely to be the pace-setting factors in any coordinated program. The extent to which all these facets of the buildup were integrated on a close time schedule would determine the rate at which effective operational capabilities were acquired.

31. For illustrative purposes, we have constructed three Soviet ICBM production and deployment programs, the implications of which are summarized in the succeeding paragraphs. These programs take into account: (a) the possibility that one or two Soviet plants are engaged in the final assembly of ICBMs; (b) reasonable production rates for a missile of the more likely size, configuration, and weight of the Soviet ICBM, when assembled in an efficiently operated facility; (c) the coordinated and efficiently scheduled activation of launching facilities at rates commensurate with the achievement of a high initial salvo capability. Details of these programs and the factors considered are given in Annex B.

32. In our view, these programs would be consistent with the present deliberate and orderly tempo of Soviet ICBM test range activity, which indicates that the USSR is not now engaged in a "crash" ICBM program, and with our estimate for planning purposes that 1 January 1960 marked the establishment of an IOC and the beginning of the planned buildup in operational capabilities.²⁷ In gen-

make Soviet planners appreciate that the attainment of a decisive military superiority with long range attack forces was impossible and unrealistic.

²⁷ The Assistant Chief of Staff for Intelligence, Department of the Army, and The Assistant Chief of Naval Operations for Intelligence, Department of the Navy, call attention to their footnotes to the estimate of IOC date for the So-

eral, it should be noted that our information with respect to the probable date of the beginning of series production of ICBMs in the USSR, our estimate of the approximate IOC date, and our consideration of the learning period likely to be involved in building up to peak rates of missile production and launcher activation, all combine to give somewhat greater confidence in the limits within which economically managed programs are likely to fall at present than in subsequent years.

33. Program "A" assumes the final assembly of ICBMs at one large plant, with series production commencing in early 1959 and building up to a peak rate of 15 missiles per month by about mid-1960, and with a coordinated program for the activation of launchers reaching a peak rate of about 10 per month at the same time. It would provide operational ICBMs and launching facilities as follows:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
ICBMs Series Produced	100	280	460	640
Operational ICBM Inventory	50	190	320	460
Operational ICBM Launchers	30	150	270	400

34. This would be a vigorous program, but one which, in conjunction with other major military programs, could be carried out without appreciable hindrance to presently planned Soviet industrial and construction programs. Such a program would still be in such an early stage that its deployment and launching facilities could have escaped detection.²⁸

viet ICBM, at paragraph 14 above. The Assistant Chief of Staff for Intelligence, Department of the Army, also calls attention to his footnote concerning ICBM series production, at paragraph 13 a above.

²⁸ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that the scale of activity required for the initial ICBM launcher deployment envisioned in program "A" would be of such a magnitude that it could not reasonably go undetected by present intelligence collection means. He would point out that the Soviets would have to have in some phase of development at present about 150 launching facilities, considering only a one-year lead time for construction as assumed in paragraph 15, Annex B. He believes, however, that the construction time

Footnote continues on next page.

35. If the foregoing schedule were maintained, the USSR would progressively acquire the following:

a. *Soon after mid-1960*, reasonable assurance of being able to detonate at least one ICBM over each of the 25 principal US metropolitan areas. In addition to the damage which could be inflicted in the specified target areas, there would be millions of casualties and widespread denials from fallout.

b. *By late 1961*, a theoretical expectation of being able, under "best" conditions,²⁹ to inflict severe damage on 90 percent of the SAC operational air base system beyond the range of Soviet 1,100 n.m. missiles.

c. *By late 1962*, a theoretical expectation of being able, under "worst" conditions,³⁰ to inflict severe damage on 90 percent of SAC operational air bases, unhardened ICBM sites, and unhardened command installations.

36. Program "B" assumes the final assembly of ICBMs at two large plants, the first producing as in program "A" and the second identical in capacity. In accordance with Soviet practice in other military programs, the initiation of series production at the second plant lags the lead plant by about a year but gains from the solution of technical and production problems by the lead plant. A peak combined production rate of 30 ICBMs per month is attained by early 1961, and coordinated launcher activation reaches more than 20 per month. Such a program would provide operational ICBMs and launching facilities as follows:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
ICBMs Series Produced	120	410	770	1,130
Operational ICBM Inventory	60	260	530	800
Operational ICBM Launchers	35	200	450	700

for soft ICBM launching facilities is from 18 to 28 months, and, therefore, that at least 150 launching facilities should have been under construction in early 1960. See his footnote to paragraph 14, Annex B.

²⁹ Assuming missiles with radio-inertial guidance and the system peaked for attack. See Annex A.

³⁰ Assuming missiles with all-inertial guidance and no time available to peak the system. See Annex A.

37. This expanded program would introduce considerable, though not insurmountable, difficulties. These difficulties would lie primarily in the requirement to attain and properly coordinate high rates of missile production, launcher activation, and troop training early in the program. We believe that up until the present time, the difference in tempo between this program and program "A" would not necessarily be great enough to insure its detection by US intelligence. On the basis of present indications, we believe a program significantly larger than this, in the near term, to be extremely unlikely. The ICBM program could be larger after 1961 if a decision to devote greater resources to it were made this year.^{31 32}

³¹ The Assistant Chief of Naval Operations (Intelligence), Department of the Navy, has expressed in another National Intelligence Estimate his minority view of the amount of fissionable material that will probably be available to the USSR in 1963. He consequently believes that program "B," in combination with the other ballistic missile programs presented in this paper as well as with all other Soviet nuclear weapons requirements, would not be feasible or reasonable and would not be pursued by the Soviets.

³² The Assistant Chief of Staff for Intelligence, Department of the Army, believes that the rate of ICBM launcher deployment envisioned in program "B" is highly improbable. Specifically, he would point out that in order to achieve such a rapid buildup, the Soviets would have to have presently under construction or completed some 200 launching facilities, considering only a one-year lead time as assumed in paragraph 15, Annex B. However, he believes that the construction time for soft ICBM launching facilities is from 18 to 28 months and, therefore, that over 325 launching facilities should be in some phase of development now, and that at least 200 would have been started before 1 January 1960. (See his footnote to paragraph 14, Annex B.) It is not reasonable to assume that this scale of activity would go undetected by present intelligence collection means.

The Assistant Chief of Staff for Intelligence, Department of the Army, believes that such a program would represent a prodigious construction feat, even by US standards, and that it would represent a crash effort very likely to be disrupted.

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38. If the foregoing schedule were maintained, the USSR would progressively acquire the following:

a. *By about mid-1961*, a theoretical expectation of being able, under "best" conditions, to inflict severe damage on 90 percent of the SAC operational air base system beyond the range of Soviet 1,100 n.m. missiles.

b. *By late 1961*, a theoretical expectation of being able, under "worst" conditions, to inflict severe damage on 90 percent of SAC operational air bases, unhardened ICBM sites, and unhardened command installations.

c. *By about mid-1962*, a close approach to a theoretical expectation of being able, under "best" conditions, to inflict severe damage on 50 percent of semihardened and hardened ICBM sites and command installations, in addition to 90 percent of SAC operational air bases, unhardened ICBM sites, and unhardened command installations. This expectation would be short-lived, however, because of the sharply increasing numbers of US hardened ICBM sites.

39. As already indicated, the foregoing illustrative programs are hypothetical constructions which we believe to be feasible and reasonable, but which cannot be substantiated by direct evidence.³³ Our inability to detect troop training or launcher construction activities in the USSR commensurate with these programs may reflect the limitations of our collection coverage. On the other hand, it may be that no substantial ICBM deployment has yet occurred in the USSR. If the latter

tive of the Soviet economy, particularly with respect to the requirement for specialized equipment and highly trained labor and technicians.

The Assistant Chief of Staff for Intelligence, Department of the Army, further observes that activity at the Soviet ICBM test range is not on a scale commensurate with any large-scale deployment program, [

]

³³ The Assistant Chief of Staff for Intelligence, Department of the Army, and the Assistant Chief of Naval Operations for Intelligence, Department of the Navy, call attention to their footnotes to paragraph 37 above.

is in fact the case, the explanation may lie in technical peculiarities of the Soviet ICBM program which are unknown to us. The Soviets may have encountered delays in their intended ICBM production, or, more likely, in the development and construction of operational handling and launching facilities. It may also be that they have elected to provide a much smaller ratio of launching facilities to missiles than we have assumed. Or it may be that they elected to establish only a limited initial operational capability on the basis of their early test results, and to defer a substantial operational buildup until their ICBM had been test-fired to 6,500 n.m. early in 1960.

40. Program "C" takes into account the possibility that the actual Soviet ICBM program may be intentionally slower and smaller than we have hitherto supposed. It assumes the final assembly of ICBMs at one plant, with series production commencing in early 1959 but building up to a peak rate of only about eight per month by about mid-1960. A large portion of the missiles series produced prior to mid-1960 are allocated to test-firings and other nonoperational purposes. Although an IOC is established by 1 January 1960, the planned program for launcher activation is deferred until that time and it builds up to a peak of about six per month by about mid-1961. Such a program would provide operational ICBMs and launching facilities as follows:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
ICBMs Series Produced	70	170	270	370
Operational ICBM Inventory	15	90	165	240
Operational ICBM Launchers	a few	50	125	200

41. In the Soviet mind, the considerations favoring such a program might be:

a. Nuclear general war would be self-defeating as a means of advancing Soviet interests. It is extremely unlikely that even a large ICBM force could confidently be expected to ensure military victory.

b. Given a strong deterrent, the circumstances which would require pre-emptive attack on the US would be extremely unlikely

to arise. If they did threaten to arise, they could be controlled by Soviet policy.

c. Consequently, what is required is a posture strong enough to deter the US from initiating general war in all situations short of a direct threat to its national existence. A relatively small force of ICBMs would suffice for this purpose. Soviet secrecy would enhance the effectiveness of such a force for deterrence and for supporting strong political and psychological pressures on the US.

d. It would be more profitable to direct resources towards winning the world by demonstrating the superiority of the Soviet system for economic and social development and by expanding Soviet influence by nonmilitary means.³⁴

³⁴ The Director for Intelligence, The Joint Staff, does not concur in paragraphs 40 through 42. He considers illustrative program "C" to be out of consonance with the available evidence, with Soviet military doctrine, and with past Soviet weapon system practices. He therefore considers illustrative program "C" invalid and unwarranted for inclusion in this document.

He considers the discussion in paragraph 41 to be inconsistent in its treatment of the Soviet view of "deterrence." He points out that, in his opinion:

a. Paragraph 41b postulates a "strong deterrent" as a backdrop, presumably, for an aggressive Soviet foreign policy. Yet, in context, this "strong deterrent" is in reality a minimal—almost a token—number of ICBMs.

b. Paragraph 41c imputes to the Soviets the judgment that this "small force of ICBMs" would bring about a supposedly new and "very intoxicating" (paragraph 20) idea of the world power balance—viz ". . . a posture strong enough to deter the US from initiating general war in all situations short of a direct threat to its national existence." The Director for Intelligence, The Joint Staff, considers that the "deterrence" of the US from initiating general war in all situations short of a direct threat to its national existence has prevailed for the past 14 years; that the Soviets are as aware as we that such "deterrence" was the result of moral factors, not military power factors; and that the Soviets are not likely to think a "small force of ICBMs" would tilt the power balance in their favor or would make the US any more acquiescent than heretofore to their "strong political and psychological pressures."

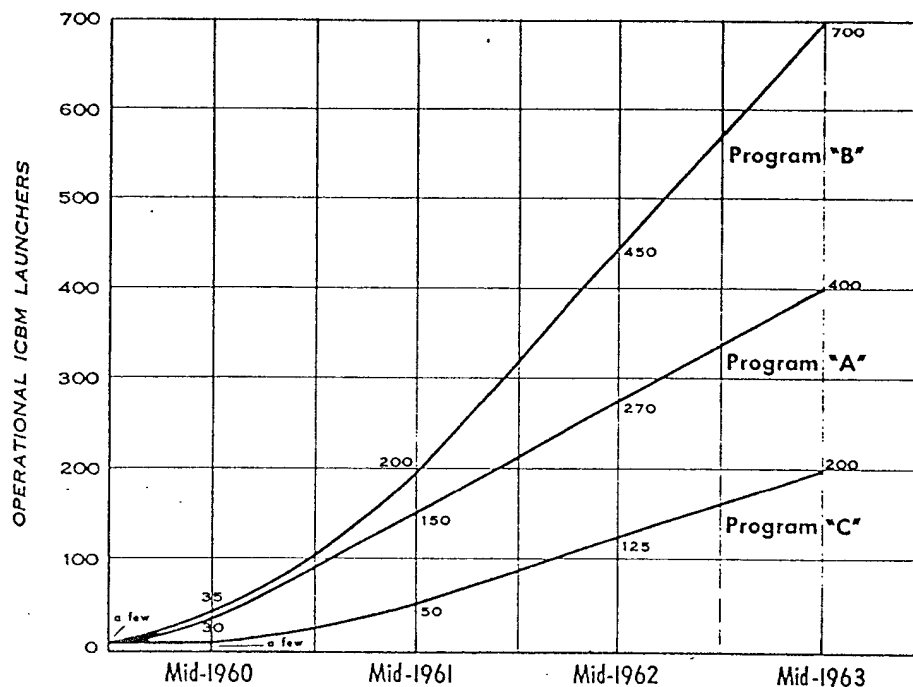
42. If the foregoing program were maintained, the USSR would progressively acquire the following:

a. *By about mid-1961*, reasonable assurance of being able to detonate at least one ICBM over each of the 25 principal US metropolitan areas. In addition to the damage which could be inflicted in the specified target areas, there would be millions of casualties and widespread denials from fallout.

b. *By late 1962*, a theoretical expectation, under "best" conditions, of being able to inflict

severe damage on 90 percent of the SAC operational air base system beyond the range of Soviet 1,100 n.m. missiles.

c. *By about mid-1963*, a theoretical expectation, under "worst" conditions, of being able to inflict severe damage on 90 percent of the SAC operational air base system beyond the range of Soviet 1,100 n.m. missiles. This expectation would be achieved, however, only at a time when the US possessed large numbers of hardened ICBM sites.



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Estimated Soviet ICBM Strength, Through 1963

43. With reference to the illustrative programs presented above, the members of the United States Intelligence Board have concluded as follows:

a. The Director of Central Intelligence considers that program "A" should be regarded as the nearest approximation of the actual Soviet program.

b. The Assistant Chief of Staff, Intelligence, USAF, believes that program "B" approximates the most likely Soviet program.

c. The Director of Intelligence and Research, Department of State, the Assistant to the Secretary of Defense, Special Operations, and the Director for Intelligence, The Joint Staff, believe that the Soviet planners would regard the advantages to be gained from having a large ICBM force in the near term as justifying the effort required for a program which would be toward the high side of the range defined by illustrative programs "A" and "B." Further, these members consider that, in light of the factors discussed in paragraph 45, the Soviet program will con-

tinue to grow, within the "A"-"B" range during the 1962-1963 period.³⁶

* The Director of Intelligence and Research, Department of State, wishes to amplify his view as expressed in this paragraph. He believes that the size of the Soviet ICBM force will depend largely on which of two general objectives the Soviets aim to achieve with this force. One possibility is that the Soviet leaders do not see sufficient advantage in building an ICBM force larger than what they would consider adequate to deter the US from initiating general war in all situations short of a direct threat to its national existence. They might consider that a relatively small and well-protected ICBM force, approximating that which would result from program "C," would suffice for this purpose, since it would pose a serious threat to major metropolitan areas by mid-1961 and an increasing threat to unhardened US bases as well in later years. If, however, the Soviet leaders believed that, during the period when the US will have few seaborne missiles or ICBMs in hardened sites, the ability to threaten SAC bases and unhardened ICBM sites would give them significant additional advantages in the confrontation with the US, they would probably adopt a more vigorous program. The resulting ICBM force would then probably approach the levels calculated for program "B" and would give the USSR a substantial pre-emptive capability before the end of 1961.

The Director of Intelligence and Research, Department of State, believes that Soviet planners would regard the advantages to be gained from having a large ICBM force in the 1960-1961 period as justifying the additional effort required by program "B." He does not exclude the possibility that the actual Soviet program is planned to provide no more ICBMs on launcher than the strength levels calculated for program "C," and he recognizes that a larger program might fall considerably short of its goals, but he believes the Soviet program is more likely to approximate illustrative program "B" in the near term. Specifically, he estimates (a) that the number of Soviet ICBMs on launcher in mid-1961 is likely to be close to the high side of the 150-200 range, and (b) that the Soviet program will probably continue at the rate projected for program "B" at least through 1961. Since there is no particular ICBM force goal which would be achieved in 1962-1963 by continuing the Soviet program at the rates calculated for programs "A" or "B," he believes the Soviet program after 1961 will either taper off or be accelerated. Of these two alternatives, he considers the latter (i.e., acceleration of the program) somewhat more likely.

d. The Assistant Chief of Staff, Intelligence, Department of the Army, and the Assistant Chief of Naval Operations for Intelligence, Department of the Navy, believe that illustrative program "C" most nearly approximates the actual Soviet program.^{36 37}

* The Assistant Chief of Staff for Intelligence, Department of the Army, believes that the actual Soviet ICBM program is no larger, and perhaps even less, than illustrative program "C." He believes the following points to be relevant:

a. In the establishment of an operational capability, the critical factors are the training of troops and the provision of operational launching facilities. As yet, the intelligence community has not identified any troop training activities, nor any operational ICBM launching facilities.

b. The deliberate and orderly tempo of Soviet ICBM test range activity } indicates that the USSR is not now engaged in a "crash" ICBM program.

c. Soviet doctrine suggests that the ICBM capability is thought of primarily in terms of deterrence and, in case deterrence should fail, pre-emptive or retaliatory attack, rather than the deliberate initiation of general war.

d. Computations of Soviet ICBMs on launcher theoretically required for an initial salvo designed to inflict severe damage on fixed targets directly related to immediate US nuclear retaliatory capabilities render results too various to provide a reliable basis for estimating Soviet ICBM force goals.

e. In the Soviet mind, a relatively small force of ICBMs would be strong enough to deter the US from initiating general war in all situations short of a direct threat to its national existence, and Soviet secrecy would enhance the effectiveness of such a force for deterrence and for supporting strong political and psychological pressures on the US.

f. The Soviets would consider nuclear general war to be self-defeating as a means of advancing their interests. To them, it would be more profitable to direct resources toward winning the world by demonstrating superiority of the Soviet system for economic and social development.

Based on an analysis of the foregoing factors, the Assistant Chief of Staff for Intelligence, Department of the Army, believes the implication which is clearest is that the Soviets have concluded that the possession of ICBM capabilities by both sides puts a still higher premium upon other forms of struggle, and that they believe their advantages in this respect are so

See footnotes on next page.

44. It is notable that the potential threat posed by programs "A" and "B" is substantially the same through 1960. Before the end of the year, either would provide a capability to inflict massive destruction on the principal US metropolitan areas. At the beginning of 1961, either would provide sufficient ICBMs and launchers to threaten the SAC operational air base system. Thereafter, the threat posed by program "B" would increase more rapidly than that of program "A." By about mid-1961, program "B" would provide Soviet planners with a high assurance of being able to severely damage most of the SAC air base system in an initial salvo, whereas program "A" would reach this point late in the year. The considerably smaller program "C" would provide a capability to inflict massive destruction on the principal US metropolitan areas sometime in 1961.

45. The present Soviet ICBM program is, of course, subject to change as the period progresses. Soviet planning for the period beyond about 1961 will be substantially affected by the actual development of US retaliatory forces, the prospects for a greatly improved Soviet ICBM, and the prospects, on each side, for an effective defense against ICBMs, as well as by the general development of the world situation and of relations between the US and the USSR. Our estimates for future years must be reviewed in the light of such develop-

great as to insure their eventual triumph without resort to general nuclear war. He would point out that, as long as the Soviets are able to maintain secrecy concerning their actual ICBM strength, their deterrence will be as effective as their propaganda. In any case, he believes that an estimated Soviet capability to detonate one ICBM over each of 25 principal US metropolitan areas in 1961 is a tremendous deterrent.

"It is the view of the Assistant Chief of Naval Operations for Intelligence, Department of the Navy, that in the light of the evidence at hand (both positive and negative), a Soviet program of ICBM production and deployment on launchers as set forth in illustrative program "C" most nearly approximates the actual Soviet program. He believes also that a program as large as illustrated in program "A" is feasible and within Soviet capabilities. Further, he believes it most unlikely that the Soviets would pursue a program larger than "A" at this time.

ments and of such additional evidence as we may obtain regarding the actual progress of the Soviet program. They must therefore be regarded as highly tentative. For these reasons, we have not projected even a tentative estimate beyond 1963.³⁸

II. MEDIUM RANGE BALLISTIC MISSILES

46. The Soviets now have available for operational use ballistic missiles of 700 and 1,100 n.m. ranges, which add significantly to their attack capabilities. These missiles are estimated to be capable of delivering 3,000 lb. nuclear payloads with accuracies of 1-2 n.m. and about 2 n.m., respectively. The 700 n.m. missile (SS-4) is believed to be road mobile, although the missiles and their carriers and support vehicles are readily adaptable to rail transport. The 1,100 n.m. missile (SS-5) is considered suitable for road or rail mobile employment.

47. Factors of timing and security, as well as the programmed improvement in Western air defenses, will make it increasingly desirable that an initial Soviet attack against Western retaliatory bases be delivered primarily with ballistic missiles. Even from within the USSR, 700 and 1,100 n.m. missiles have sufficient range to reach a large majority of such bases in Eurasia and its periphery. Numerous missiles with maximum ranges of 75 to 350 n.m. will also be available during the 1960-1965 period.³⁹ Although they are not considered in detail in this estimate, it should be noted that a portion of these shorter range missiles may be equipped with nuclear warheads and (assuming forward deployment) could contribute to an initial attack on critical Western targets. A substantial but decreasing force of manned bombers will be available throughout the period for follow-on attack and other related missions.

48. We believe that 700 and 1,100 n.m. missiles are in series production, but our evidence

³⁸ The Assistant Chief of Staff, Intelligence, USAF, believes that an estimate beyond 1963 can be made. He believes that, lacking contradictory information, the rates of increase shown in program "B" should be continued through 1965.

³⁹ See NIE 11-4-59, Annex A, paragraphs 48-49.

is insufficient to establish production rates.

700 n.m. missiles firings have been at a sharply reduced rate in recent months. There continue to be numerous firings of 1,100 n.m. missiles, fragmentary evidence on the movements of missile-associated equipment, suggest that 700 n.m. missiles have been deployed to East Germany and to key points near the Soviet borders in Europe, the Far East, and the Transcaucasus. There is also fragmentary evidence to suggest that 1,100 n.m. missiles have been deployed to the Soviet Far East.

49. In view of our estimate that the 700 n.m. missile was ready for operational use as long as four years ago, and that the 1,100 n.m. missile has been operational for about 18 months, it is possible that the USSR now has large operational inventories of these weapons. We believe it more likely, however, that production and deployment to date have been on a moderate scale. This judgment takes into account the paucity of evidence on deployment, the restrictions which may have been imposed on warhead production by the USSR's supply of nuclear materials, and the availability of other Soviet delivery systems. Most important, it recognizes that even relatively modest programs in 700 and 1,100 n.m. missiles would provide the Soviets, by 1960 or 1961, with a force capable of seriously threatening the major Western landbased retaliatory targets within range.

50. The table below includes numbers of launchers estimated as required for a Soviet initial salvo capability, together with estimated operational inventories of missiles for such a salvo as well as for subsequent use in the initial phase of a general war and for employment in later phases of a sustained conflict. The entire table, including the estimate for mid-1960, is based on the general considerations set forth in the preceding paragraphs, rather than on direct evidence.

It represents no change from our previous estimate.

	Mid-1960	Mid-1961	Mid-1962	Mid-1963	Mid-1964	Mid-1965
SS-4 (700 n.m.)						
Launchers *	110	150	150	150	150	150
Missiles	250	350	450	450	450	450
SS-5 (1,100 n.m.)						
Launchers *	50	100	100	100	100	100
Missiles	80	160	240	300	300	300

51. Of the foregoing missiles, at least those intended for an initial salvo would probably be equipped with high-yield nuclear warheads, while the remainder would probably have various yields in order to provide Soviet forces with operational flexibility. Should circumstances require larger numbers of missiles or launchers, their production and deployment over the next few years would not present serious difficulties to the USSR.

III. LONG RANGE BOMBERS AND AERODYNAMIC MISSILES

52. It is clear that the USSR will place increasingly heavy reliance on ballistic missiles as long range nuclear delivery systems. Nevertheless, observed Soviet military practice suggests that Long Range Aviation will be maintained as an effective force in being at least until a formidable ICBM capability has been established. Even thereafter, the USSR will have a requirement for manned bombers, though in lesser numbers. Soviet planners will continue to view bombers as useful for a variety of purposes, including attacks on small or hardened targets, damage assessment, reconnaissance, and attacks on targets of uncertain location. The recall capability of the bomber would add to its operational value. Bombers and other aerodynamic vehicles, operating in conjunction with a powerful ballistic missile force, will provide the Soviets with diversification and flexibility in their offensive capabilities.

53. Recent evidence supports the view that the USSR is maintaining interest in long range bombers and other aerodynamic vehicles despite its increasing strength in ballistic mis-

* The Assistant Chief of Staff, Intelligence, USAF, believes that each operational missile would be provided with a launcher.

siles. Heavy bomber production continues at a slow but fairly steady pace. Research and development work is under way on more advanced bombers and on air-to-surface missiles suitable for launching by medium and heavy bombers. These trends contradict Khrushchev's repeated allegations that bombers are obsolete and his implication that military aviation will be virtually replaced, not simply reduced, in the near future. The evidence is more consistent with Defense Minister Malinovsky's statement (in January 1960) that, while rocket troops have become the main type of armed forces, other types are to be retained at appropriate levels. We conclude that the announced Soviet force reductions will bring some reduction in long range bomber strength, but that five years hence the USSR will probably still retain a substantial force.

Long Range Aviation

54. There has been little change in the strength, status, and deployment of Long Range Aviation in recent months. This force continues to be the principal component of Soviet military strength capable of long range nuclear weapons delivery. We estimate that, as of mid-1960, it comprises some 135 heavy bombers and tankers of the BISON jet and BEAR turboprop types, about two-thirds of them BISONs, as well as some 1,100 BADGER jet medium bombers and tankers.⁴¹ The piston-engine BULL is no longer considered part of the operational force, although some such aircraft probably remain in Long Range Aviation units for utility purposes.

55. Of the foregoing aircraft, only the BISON is still in production. Approximately 135 had been produced through May 1960. In recent months the production rate appears to have been more stable than in the earlier years of the program. The current rate is approximately 2-3 BISONs per month, and there is nothing to indicate any tapering off. We therefore continue to estimate that BISON

will be produced at about the present rate for the next year or so.

56. We have no firm evidence that any more advanced Soviet heavy bomber is now under development or in production. The USSR may still be experimenting with the BOUNDER, a large prototype observed in August 1958, but there is no indication that it is likely to be introduced into operational units. A better than marginal improvement over present Soviet heavy bomber models could be achieved by development of a nuclear powered aircraft. Such an aircraft would have long range and duration of flight, limited by permissible crew radiation doses, with a consequent ability to penetrate US air defenses at low altitudes. It could be employed for weapon delivery or reconnaissance, as well as for other purposes such as airborne early warning. Test flights of a subsonic nuclear-powered aircraft could be undertaken during the period of this estimate; first operational availability could probably be in about 1966.⁴²

57. The USSR is now developing a new medium bomber capable of supersonic "dash," and we believe it could become available for operational use in 1961. (On the basis of indications available at the time, such an aircraft was estimated in NIE 11-8-59 as a possibility, for first operational use in 1962 or later.) The new bomber will probably have a range slightly greater than that of the BADGER. Its primary applicability is therefore likely to be against Eurasian and peripheral targets, although it could operate over the US on one-way missions, or on two-way missions with multiple inflight refueling. It is probably intended to replace some BADGERs for highly specialized uses, including air-to-surface missile delivery.

58. Considering the utility of long range bombers and the investment the USSR had made in them, we estimated in NIE 11-8-59 that Long Range Aviation strength would remain fairly constant over the next year or

⁴¹ For estimated performance characteristics of Soviet long range bombers, see Annex C.

⁴² The Assistant Chief of Staff, Intelligence, USAF, believes this date should be 1964.

two and then decline gradually. A normal phase-down in BADGER strength, assuming no large-scale production of a follow-on type, would reduce the force by some 300 bombers over the next four or five years. We now believe it more likely that a deliberate cut of about this magnitude will be taken during the period of force reductions in the next 18 months. The estimated buildup to a force of perhaps 100 supersonic "dash" bombers in the period from 1961 to 1963-1964 would tend to offset normal attrition of BADGERS during that period. The heavy bomber force will probably increase to about 150 aircraft in 1961, and then decline gradually as BISON production ceases and BEARs are retired. In sum, we estimate as follows the probable strength of Long Range Aviation during the next five years:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963	Mid-1964	Mid-1965
Bombers and Tankers "						
Heavy	135	150	140	130	120	100
Medium "	1,100	950	800	800	800	750

59. BISONs and BADGERS will thus remain the most numerous of the bombers in Long Range Aviation during the period of this estimate. Some improvement in the performance of these aircraft, notably in their range, will probably be achieved in the near future through propulsion system modification. Other improvements in operational capabilities will probably include the equipment of

"The Assistant Chief of Staff, Intelligence, USAF, believes that the numbers of bombers and tankers should read:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963	Mid-1964	Mid-1965
Bombers and Tankers						
Heavy	135	150	175	200	200	200
Medium*	1,100	1,000	950	900	800	800

* Probably including a few new supersonic "dash" medium bombers in 1961, building up to some 300 in mid-1965.

"Of these, the majority will be BADGERS. The total will probably include a few supersonic "dash" medium bombers in 1961, building up to perhaps 100 by 1963-1964.

all long range bombers with active jamming equipment. Navigation and communications equipment will be satisfactory for all bomber missions, with the possible exception of night and bad weather operations at very low altitudes. Regardless of reductions in the overall size of the force, proficiency will be retained and improved in such critical areas as nuclear weapons handling, inflight refueling and Arctic staging, and probably in the use of decoys, air-to-surface missiles, and other penetration aids.

60. Based on the trends outlined above, and considering our revised estimate (in NIE 11-2-60) of fissionable material availability in the USSR as well as the increasing demands of ballistic missile warheads, we expect little if any increase in the total number of nuclear weapons allocated to Long Range Aviation. It is equally unlikely, however, that there will be any drastic near-term reduction, since to the extent of their ability the Soviets will probably wish to provide multiple weapon delivery and restrike capabilities for their bombers. We believe that as Soviet strength in ICBMs, submarine-launched, and medium range ballistic missiles grows and as the role of aircraft becomes more specialized, the megatonnage allotted to warheads for these missiles will come to surpass that allotted to the bombers of Long Range Aviation. In our view, this is likely to occur by about 1963.

61. *Medium Bombers of Other Components.* The number of BADGERS in components other than Long Range Aviation is about 400 aircraft, of which about 300 are assigned to Naval Aviation and about 100 are in Tactical Aviation. These medium bomber strengths will probably be increased somewhat through reassignments from Long Range Aviation; we believe this trend is already under way, at least in the case of Naval Aviation. It is also possible that supersonic "dash" medium bombers will be introduced into Tactical and Naval components. Naval BADGER units are specially trained and equipped to attack such targets as carrier task forces at sea, while Tactical units are intended primarily to support ground force operations. The medium bombers of Tactical and Naval Aviation

would presumably be employed for attack on Eurasian and peripheral targets, rather than on targets in the US.

Air-to-Surface Missiles ⁴⁵

62. About eight BADGER regiments are probably now equipped with the subsonic, 55 n.m. AS-1 missile and trained in its use. Assuming that unit holdings now average two AS-1 missiles per aircraft, we estimate the present Soviet operational inventory at 400-500 missiles. This missile was designed primarily for use against ships, although it can also be employed against well-defined radar targets such as prominent coastal installations. During the period of this estimate the AS-1 will probably be supplemented and finally replaced by a transonic 100 n.m. missile, which will probably be ready for operational use in about 1961. This new system (AS-3) should overcome the severe limitations in launching altitude imposed on BADGERS by the AS-1. The combined Soviet inventory of these two antiship weapons will probably remain fairly stable at around 500 missiles over the next few years. Some portion of the inventory will probably be equipped with nuclear warheads of low and medium yields, the remainder employing HE.

63. A supersonic air-to-surface missile with a range of at least 350 n.m., primarily for use against land targets, will probably also become operationally available in about 1961. This system (AS-2) will probably be employed to increase the chances of penetration to heavily-defended targets by currently-operational heavy bombers, thus extending their useful service life, and will presumably be compatible with supersonic "dash" medium bombers. On this basis, an operational inventory of some 200 AS-2 missiles is likely to be built up during the period 1961-1965. The CEP of these missiles, estimated at about 2 n.m., and their mission against land targets, would probably require that they be equipped with high-yield nuclear warheads.

⁴⁵For a more detailed estimate of these missiles and their performance characteristics, see NIE 11-5-60.

Ground Launched Cruise-Type Vehicles

64. We estimate that the Soviets are developing and could have available for operational use in 1961-1963 a ground-launched, ramjet propelled vehicle with a speed of about Mach 3, an altitude of 65,000-70,000 feet, and a range in excess of 4,000 n.m. Such a system could be employed for weapon delivery or reconnaissance, and would further complicate Western air defense problems. Until further information becomes available on this system, it is impossible to predict the manner in which it will contribute to Soviet capabilities for long range attack or the degree of reliance the USSR will place upon it.

IV. SUBMARINE-LAUNCHED MISSILES ⁴⁶

65. We believe that the Soviets are building a missile-launching submarine capability to deliver high-yield nuclear warheads. The number of submarines they could deploy in launching positions off US coasts without undue risk of forfeiting strategic surprise would depend on the pattern of operations that had been established in advance. At present, the number that could be so deployed is very small, but it could be increased over the coming years by more extensive out-of-area operations of the long range submarines of the Northern and Pacific Fleets. Soviet planning, however, does not appear to contemplate delivery of the main weight of an attack by means of submarine-launched missiles.

66. We estimate that the USSR now has a limited capability to launch ballistic missiles from about a dozen long range, conventionally-powered submarines. Four of these are "Z" class submarines, which were modified in 1956-1957 by enlarging the sail and installing hatches and vertical tubes, probably to accommodate ballistic missiles. They may have served as prototypes for a comparable new class of submarine, designated "G" class, which has been in production since 1958 and about nine of which are now considered operational. Although only fragmentary information is available on this class, we believe

⁴⁶For a more detailed estimate on these missiles and their performance, see NIE 11-5-60.

it is probably also designed to accommodate ballistic missiles. For missile launching, both the "Z" and "G" class submarines would need to be surfaced, or more likely in sail awash condition. We have no specific information on the ballistic missiles they employ. Considering the size and configuration of the submarines, however, we have estimated their capabilities as follows:

	"Z" Class	"G" Class
Missiles carried	2 each	about 6 each
Missile designation	SS-11	SS-12
Missile range "	200, possibly 350 n.m.	350, possibly 700 n.m.
Missile payload	2,000 lbs., nuclear	2,000 lbs., nuclear
Operational CEP	1-2 n.m.	1-2 n.m.

67. Over the next few years, the USSR will probably build a limited number of "G" class submarines in an interim program continuing at least until a more advanced ballistic missile/nuclear submarine system is available. Both "Z" and "G" class missile-launching submarines will probably be retained throughout the period of this estimate. There has, however, been no additional information of the few submarines believed to have been converted some years ago to topside stowage of cruise-type missiles, and we no longer consider them operational.

68. We estimate that the USSR will develop a system capable of delivering ballistic missiles against land targets from a submerged nuclear-powered submarine. In view of operational considerations, a system of this type

"The Assistant Chief of Naval Operations for Intelligence, Department of the Navy, and the Director for Intelligence, The Joint Staff, believe it probable that a 350 n.m. missile is used with both the "Z" and "G" class submarines.

with a missile range of at least 500 n.m. would maximize the Soviet naval contribution to the USSR's capacity to deliver coordinated strikes on short notice against US targets. A considerable portion of the total number of operational Soviet nuclear-powered submarines—perhaps half—could be deployed off US coasts at all times, provided that the Soviets developed proper operating procedures and trained alternate crews.

69. Assuming that an active development program is well under way, we have estimated, in NIE 11-5-60, that in 1961-1963 the USSR could first have available for operational use a ballistic missile system (SS-9) for submerged launching and capable of delivering a 1,000 lb. payload to a range of 500-1,000 n.m. with a CEP of 1-3 n.m. We continue to believe this represents the Soviet technical capability despite our lack of evidence of actual development work. There is no firm evidence that any Soviet nuclear-powered submarines are yet assigned to operational units, although we believe that the USSR has an active program and that a few such submarines probably now exist. Thus the Soviet nuclear-powered submarine program is probably sufficiently far advanced so that the SS-9 system could be incorporated as soon as the missile becomes available. A Soviet nuclear-powered submarine might carry 6-12 such missiles. The USSR could probably introduce a few nuclear-powered missile submarines into operational units annually, while continuing the construction of nuclear submarines equipped with torpedoes.

70. On the basis of the preceding discussion, we project as follows the probable numbers of ballistic missile submarines, and their missiles, in Soviet operational units through mid-1965:

	Mid- 1960	Mid- 1961	Mid- 1962	Mid- 1963	Mid- 1964	Mid- 1965
Nuclear-Powered Submarines			2	6	10	14
500-1,000 n.m. missiles ⁴⁸			12-	36-	60-	84-
"G" class submarines	9	14	18	18	18	18
350, possibly 700 n.m. missiles ^{47 48}	54	84	108	108	108	108

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	Mid- 1960	Mid- 1961	Mid- 1962	Mid- 1963	Mid- 1964	Mid- 1965
Modified "Z" class submarines	4	4	4	4	4	4
200, possibly 350 n.m. missiles ⁴⁷ ⁴⁸	8	8	8	8	8	8

"The numbers of missiles shown in this table are for one combat load per submarine. We assume that the USSR would maintain an operational inventory of missiles (excluding those for training and other noncombat purposes) sufficient to provide for at least two combat loads per submarine.

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ANNEX A
THEORETICAL SOVIET ICBM REQUIREMENTS

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ANNEX A

THEORETICAL SOVIET ICBM REQUIREMENTS

1. As an approach to an appreciation of the military capabilities which various numbers of Soviet ICBMs would represent, we have computed the numbers of ICBMs on launchers required to give Soviet planners a theoretical expectation of being able to inflict, in an initial salvo, severe damage on SAC bomber bases and other fixed installations directly related to immediate US nuclear retaliatory capabilities. The factors employed in these computations, and the results, are set forth below.

2. The ICBM weapon system is inherently limited to attack on targets the precise locations of which are known in advance. Consequently, although the primary object of attack would be bombers and other delivery vehicles, Soviet ICBM capabilities can be analyzed only in terms of attack on bomber bases and other fixed installations. In evaluating the military significance of such capabilities, Soviet planners would have to take into account the mobility and reaction times of the forces that were the true object of the attack, as well as the problems of achieving simultaneity and surprise in coordinated attacks against Western forces deployed in widespread areas. Any theoretical numerical requirements would be subject to the considerations discussed in paragraph 28 of the main text.

3. It is emphasized that this target study and the calculations derived from it are presented only as an example of considerations the Soviets might take into account in analyzing their theoretical requirements for ICBMs to be employed against targetable US retaliatory force bases. They reflect only one of a number of possible Soviet concepts for the employment of ICBMs. Moreover, numerical requirements themselves are among many inputs to a final Soviet determination of the ap-

propriate scale and pace of a production and deployment program.

Soviet ICBM Characteristics

4. In computing the numbers of Soviet ICBMs on launchers theoretically required to give Soviet military planners high assurance of being able, in an initial salvo, to inflict severe damage on various target systems, we have used operational characteristics derived from NIE 11-5-60, "Soviet Capabilities in Guided Missiles and Space Vehicles," dated 3 May 1960. NIE 11-5-60 estimates progressive improvements in the operational performance of Soviet ICBMs over the period 1960-1963. We have interpolated as necessary between the values estimated for 1960 and for 1963.

5. In our computations we have distinguished between a "best condition" and a "worst condition." The "best condition" assumes missiles with radio-inertial guidance and the system peaked for attack at a designated time known well in advance. The "worst condition" assumes missiles with all-inertial guidance and no time available to peak the system. A probable case would lie between these extremes. For relevant discussion, see NIE 11-5-60, paragraphs 7-12.

6. The values used for these variables are set forth in the tables below:

	"Best Condition"			
	Mid-1960	Mid-1961	Mid-1962	Mid-1963
CEP (n.m.)	2.7	2.2	1.8	1.5
Reliability (Percent)				
On Launcher	82	85	88	90
In Flight	70	75	78	80
Combined (approx.)	60	65	70	75
	"Worst Condition"			
	Mid-1960	Mid-1961	Mid-1962	Mid-1963
CEP (n.m.)	4.5	3.4	2.6	2.0
Reliability (Percent)				
On Launcher	70	75	78	80
In Flight	70	75	78	80
Combined (approx.)	50	55	60	65

7. In all cases we have assumed a 6,000 lb. nuclear warhead, attributing to it the yield indicated in NIE 11-2-60, "The Soviet Atomic Energy Program," dated 21 June 1960 (limited distribution). We have also assumed, as in NIE 11-5-60, paragraph 12, that all ICBMs rated as reliable on launcher would actually leave their launchers at scheduled times or not later than 15-30 minutes thereafter.

Target System

8. Explicit information on the future development of the US nuclear retaliatory force base structure is presumably not available to Soviet military planners, but we believe that they have enough general information from open sources to be able to estimate with fair accuracy. In our computations we have assumed the development of the target system indicated in the table below, as a reasonable approximation of a present Soviet estimate.

Type of Target	Numbers of Aiming Points			
	Mid-1960	Mid-1961	Mid-1962	Mid-1963
SAC Operational Air Bases	60	75	75	70
Unhardened ICBM Sites	3	9	9	9
Unhardened Control Centers	3	3	3	3
Semihardened Control Centers	1	1	1	1
Semihardened ICBM Sites	0	10	28	28
Hardened ICBM Sites	0	3	41	269

Damage Criteria

9. The criterion of severe damage was used in the calculations of requirements for the target systems discussed. This criterion, as used by US military planners, calls for the following damage on various types of targets:

Type of Target	
Unhardened ICBM Site	Overturing erected missiles, causing severe damage to nearby above ground facilities.
Semihardened ICBM Site	[
Hardened ICBM Site	[

Type of Target

Airbases Damage to parked aircraft so as to require depot repair and moderate to severe damage to above ground facilities.

Results of Computations

10. *Example A:* the numbers of Soviet ICBMs on launchers required to give Soviet planners a theoretical expectation of being able to inflict, in an initial salvo, severe damage on 90 percent of the SAC operational air base system beyond the range of Soviet 1,100 n.m. missiles.

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
"Best Condition"	[]
"Worst Condition"	[]

In this case, the number of missiles theoretically required declines over time because the target system remains relatively constant while the accuracy and reliability of the missile are progressively improved.

11. *Example B:* the same as Example A, with the addition of unhardened ICBM sites and command installations to the target system.

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
"Best Condition"	[]
"Worst Condition"	[]

It will be seen that these theoretical requirements are not significantly greater than those computed for Example A.

12. *Example C:* the same as Example B, with the addition of semihardened and hardened ICBM sites and command installations to the target system.

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
"Best Condition"	[]
"Worst Condition"	[]

In this example, the steep increase in theoretical ICBM requirements after 1961, despite estimated improvements in the Soviet ICBM, results from the anticipated increase in the numbers of semihardened and hardened ICBM sites in the target system.

13. *Example D*: the same as *Example C*, except to give Soviet planners a theoretical expectation of inflicting severe damage on only 50 percent (rather than 90 percent) of the semihardened and hardened targets in the system.

	Mid- 1960	Mid- 1961	Mid- 1962	Mid- 1963
"Best Condition"	[
"Worst Condition"]

This example also shows a sharp increase in theoretical ICBM requirements after 1961, but without going to the exorbitant extremes of *Example C*.

Other Possible Variations

14. It is possible that the Soviets view their numerical requirements for ICBMs as much larger or smaller than the numbers indicated above. The foregoing examples are limited to US bases from which the most immediate retaliation could be mounted, but additional targets might be included in a Soviet study of ICBM requirements against US warmaking capabilities. On the other hand, insofar as the mission of destroying US retaliatory forces is assigned to other weapon systems (notably bombers and missile-launching submarines), Soviet theoretical ICBM requirements would be reduced. Finally, calculations of theoretical requirements are highly sensitive to variations in the detailed inputs, especially those for ICBM characteristics and damage criteria.

15. If, for example, expectation of a long war led Soviet planners to consider it essential to deliver an ICBM attack specifically against key US centers of population and industry, in addition to retaliatory force bases, their military requirement might include high assurance of being able to detonate one ICBM over each of the 25 principal US metropolitan areas. (Together, these areas contain about 35 percent of the total US population and 60 percent of US defense manufacturing facilities.) The inclusion of such a requirement in an initial salvo would increase by some 50-100 the required numbers of Soviet ICBMs on launchers. Similarly, some 20-40 ICBMs on launcher would be added to the theoretical requirement if the Soviets desired high assurance of being

able to detonate one missile over each of 10 US naval bases serving aircraft carriers and missile-launching submarines. Considerably greater increases in total theoretical requirements would result if the Soviets considered it necessary, in an initial ICBM salvo, to attack US air defense capabilities and installations which indirectly support or could be used to support the retaliatory force: nuclear weapons storage sites, airfields to which SAC bombers might disperse, etc.

16. The Soviets' view of their own numerical requirements for ICBMs against bases with immediate retaliatory capabilities might be reduced by a variety of circumstances, including the use of techniques designed to minimize the degradation of system effectiveness caused by reliability factors. One such technique is the "reprogramming" of Soviet ICBMs: rather than salvaging the total number of missiles theoretically required, standby missiles might be launched in only those cases where a missile assigned to the first salvo were known to have failed on launcher or prior to burnout.⁴⁹ Preliminary studies suggest that "reprogramming" might reduce by as much as 25-45 percent the theoretical "best condition" requirements for ICBMs on launcher against the unhardened target systems considered in Examples A and B. It would have relatively little effect on requirements against the hard targets included in Examples C and D, where the critical factor is accuracy, not reliability. US exploration of "reprogramming" has not yet established its operational feasibility, and there is no evidence that the USSR is develop-

⁴⁹ Employment of the "reprogramming" technique involves: (a) ascertaining, by radar tracking or telemetry, whether or not a missile in the first salvo failed during its powered flight phase; (b) prompt insertion of alternate trajectory data into standby missiles which have been counted down along with first-salvo missiles, so that they can be assigned to whichever targets are left uncovered by preburnout failures in the first salvo; (c) delaying the launching of standby missiles by as much as five minutes, the time required for first-salvo missiles to complete the burning phase; and, possibly, (d) compensating for the delays incurred by the appropriate use of alternate trajectories to achieve near-simultaneous arrival of missiles on target.

ing such a technique. We therefore have not used "reprogramming" as the basis for computing theoretical Soviet requirements.

17. The USSR's theoretical requirements against the target system considered in Examples C and D would be significantly reduced if the performance characteristics of its ICBM system were better than we have estimated. Soviet expectations regarding the accuracy of their ICBM under operational conditions would be critical to their evaluation of requirements against semihardened and hardened targets. For example, if system CEP with radio-inertial guidance were expected to approximate 1 n.m. in mid-1963 (rather

than the 1.5 n.m. used in our computations), the theoretical requirement for an expectation, under "best" conditions, of inflicting severe damage on 90 percent of the entire target system used in Example C would be reduced from [

] If combined with Soviet acceptance of an expectation of inflicting severe damage on only 50 percent of the semihardened and hardened targets, such an improvement in accuracy would reduce the theoretical requirement, under "best" conditions, against the target system used in Example D from [

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ANNEX B

ILLUSTRATIVE SOVIET ICBM PRODUCTION AND DEPLOYMENT PROGRAMS

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ANNEX B

ILLUSTRATIVE SOVIET ICBM PRODUCTION AND DEPLOYMENT PROGRAMS

1. In building substantial operational capabilities with ICBMs, the Soviets must achieve a high order of planning and accomplishment in the production of missiles, establishment of launching facilities, provision of logistic support, and training and activation of operational units. The last three of these types of activity, particularly the establishment of launching facilities, are likely to be the pace-setting factors in any coordinated program. Although for convenience this Annex treats production and deployment separately, the extent to which all aspects of the buildup were integrated on a close time schedule would determine the rate at which effective operational capabilities were acquired.

2. We have reviewed all evidence bearing on the question of Soviet ICBM production and find it insufficient to establish present or planned production rates. However, the evidence is sufficient to draw the following conclusions:

a. Series production⁵⁰ of ICBMs probably began in the USSR in early 1959.⁵¹ This judgment is based on the time elapsed since the start of test firings in 1957, the generally successful results of the test program, and especially the increased rate of firings in 1959, all of which lend credibility to Khrushchev's claim in early 1959 that series production was then beginning.

b. Final assembly of ICBMs may be taking place at one or more plants. We now have limited evidence pointing to two Soviet cities as possible production sites.

c. Prototype ICBMs and some space vehicles were probably assembled at a Soviet ballistic missile research and development facility which we believe does not engage in large-scale production. This facility may continue to provide some of the vehicles used for space launchings and ICBM research and development.

3. From an economic point of view, the main limitation on Soviet ICBM production during the first year or two of the series production program would not be the availability of material or budgetary resources, but rather the time required to solve the engineering problems inherent in the initiation of any industrial process, and to train the labor force. The rate of production would increase gradually over a learning period until the planned peak rate of production was achieved. This factor, together with our knowledge of Soviet ICBM test range activities to date, is a principal reason for somewhat greater confidence in the limits within which economically managed Soviet programs are likely to fall at present than in subsequent years.

Production of Missiles

4. For illustrative purposes, we have constructed three ICBM production programs, the implications of which with respect to operational inventory are summarized in paragraph 9 below. Illustrative program "A" assumes the final assembly of ICBMs at one large plant, completing its first missile in early 1959 and building up to a peak rate of 15 missiles per month by about mid-1960, i.e., in about a year and a half. The rate of 15 per month is chosen because, on the basis of limited US experience and feasibility studies, this appears to be a reasonable number for a missile of the more likely size, configuration, and weight of the Soviet ICBM, when produced in an effi-

⁵⁰Series production is the production of missiles of like type in accordance with a planned buildup rate. The date at which series production commences is defined as the date of completion of the first missile in the series.

⁵¹The Assistant Chief of Staff for Intelligence, Department of the Army, calls attention to his footnote to paragraph 13a of the Discussion.

ciently operated final assembly facility.⁵² For each such final assembly plant in any program there would be a number of subsidiary plants to supply specialized components and sub-assemblies.

5. Program "B" assumes that two plants are employed for ICBM final assembly, the second identical with the first in capacity. In accordance with Soviet practice in multifacility programs for other major military items, a second plant would lag the lead plant in order to profit from its solution of technical and production problems. In this program, we therefore assume that the second plant completed its first missile in early 1960 but that its peak production rate of 15 ICBMs per months.⁵³ The average time involved in ac-one year.

6. Program "C" assumes the final assembly of ICBMs at one plant, completing its first missile in early 1959 but building up to a peak rate of only about eight missiles per month (about 100 per year) by mid-1960, i.e., a year and a half later.

7. In developing these illustrative production programs, we have assumed that production continues at the stated peak rates through mid-1963, once these rates have been achieved. To determine the quantity of ICBMs likely to be available for operational inventory at any given time, given the total number serially produced, allowances must be made for the time required in initial checkout and logistic pipeline, and for the missiles that would be expended for nonoperational purposes. We believe it reasonable to allow two months' pipe-

line between completion of a missile and its availability for the inventory. In programs "A" and "B," a further reduction of 25 percent is made to account for missiles used in training and proof testing, as well as those that would be unavailable because of normal attrition and major maintenance. In program "C," a much larger percentage reduction is made in the period from early 1959 to mid-1960, on the assumption that a large portion of the missiles series produced during that period were allocated to test-firings and other nonoperational purposes.⁵³

8. An allowance of 25 percent for nonoperational purposes may be on the low side, particularly if there is a sharp increase in Soviet space launchings and in firings of ICBMs for further research and development. However, such demands could be met at least in part by the continued supply of vehicles from the ballistic missile research and development facility.

9. There follows our summary of the three illustrative Soviet ICBM series production programs, and the numbers of missiles they might make available for operational inventory at mid-years 1960 to 1963:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
<i>Program "A" (one plant)</i>				
Cumulative series production	100	280	460	640
Available for operational inventory	50	190	320	460
<i>Program "B" (two plants)</i>				
Cumulative series production	120	410	770	1,130
Available for operational inventory	60	260	530	800
<i>Program "C" (one plant)</i>				
Cumulative series production	70	170	270	370
Available for operational inventory	15	90	165	240

⁵² In reaching this judgment, we have taken into account: (a) US experience in the production of Atlas and Titan missiles; (b) evidence which leads us to believe that the Soviet ICBM is a one and one-half staged (Atlas type) vehicle or a parallel staged vehicle, with the former configuration somewhat more likely; (c) evidence and analysis suggesting that the structural weight of the Soviet ICBM, less nosecone and propulsion system, is 50 to 100 percent greater than that of the Titan; and (d) evidence on the industrial engineering methods used in constructing the final stage of the Lunik vehicle.

⁵³ Soviet accomplishment of more than 25 successful ICBM shots and 7 space launchings to date implies that on the order of 50 basic ICBM vehicles have been expended in test range activities. It is not known what proportion of these were built as prototypes in the Soviet ballistic missile research facility, as opposed to those assembled in a series production facility.

Establishment of Launching Facilities

10. The production of these missiles would have little significance without corresponding launcher construction programs, including production of related ground support, launching, and guidance equipment. The number of launchers is a good measure of the amount of activity involved in a given ICBM program, since it includes all the facilities, other than the missiles themselves, which are necessary to the operational weapon system. Included are ground guidance facilities, test, checkout and maintenance equipment, fueling and storage facilities, as well as housing and general purpose equipment.

11. We have no new evidence to establish the Soviet ICBM deployment concept. We continue to believe that the system could be rail mobile but that the overall deployment program may include hard or soft fixed facilities, rail mobile units, or a combination of these methods. In any case, the system will probably be heavily dependent on the Soviet rail network and launching sites are not likely to be found in areas remote from rail support. In a fixed deployment system, the primary problems would lie in the efficient scheduling and completion of large-scale construction projects, presumably in widespread locations. In a rail system, they would lie in the scheduled construction of special cars, installation of necessary equipment in them, and orderly activation of complete missile trains; the construction of fixed facilities at launch points would be a lesser part of the effort but would still have to be scheduled into the entire program.

12. We continue to believe that the USSR would seek to have a large initial salvo capability in its ICBM force. Because of the planned fast reaction times of US nuclear delivery forces, a large initial salvo capability would be essential for purposes of pre-emptive attack against them. By permitting the multiplication and dispersal of aiming points in the USSR, it would probably also be viewed by Soviet planners as useful for deterrent or even retaliatory purposes. Consequently we assume that the Soviets would coordinate

their programs for missile production and launcher activation so that, at any given time in the next few years, there would be a rough equality between the number of operational launching facilities and the number of ICBMs expected to be in commission. On this basis, we set forth below three launcher activation programs, generally corresponding to illustrative production programs "A," "B," and "C."

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
<i>Program "A"</i>				
Operational ICBM inventory	50	190	320	460
ICBMs in commission *	30-40	130-160	250-280	390-410
Launchers activated	30	150	270	400
<i>Program "B"</i>				
Operational ICBM inventory	60	260	530	800
ICBMs in commission *	35-50	180-220	410-470	680-720
Launcher activated	35	200	450	700
<i>Program "C"</i>				
Operational ICBM inventory	15	90	165	240
ICBMs in commission *	9-12	60-75	125-145	200-215
Launchers activated	a few	50	125	200

13. Regardless of the type of sites employed, either of the launcher activation programs in programs "A" and "B" would require intensive efforts to build up to peak rates of launcher activation soon after IOC date, and maintenance of sustained rates over a considerable period. Program "A" would involve the activation of about 10 launchers per month from mid-1960 on, and program "B" would require a peak rate of over 20 per month after a somewhat longer buildup period. In program "C," the planned buildup of operational launchers is deferred until the establishment of the IOC in January 1960, and a peak launcher activation rate of only about six per month is reached by about mid-1961.

* In commission rates, derived from the working assumptions given in NIE 11-5-60, paragraph 11, are as follows:

	Mid-1960	Mid-1961	Mid-1962	Mid-1963
			(Interpolated)	
Percent	60-80	70-85	78-88	85-90

14. We believe that Soviet siting concepts would stress simplicity, but that construction and installation lead times for fixed launchers would nevertheless be on the order of 9-18 months.⁵⁵ The average time involved in activating large numbers of launchers could vary considerably, depending not only on the urgency of the schedule, but also on such factors as the location and dispersal of individual sites, the terrain, and the degree of hardness desired. For an ICBM system employing non-storable liquid fuel and radio-inertial guidance, which we believe to be the case at present, even the simplest Soviet launch site would probably include: facilities for missile receipt, checkout, and minor maintenance; command and communications facilities; launch control and ground guidance facilities; launch pad(s) with provision for missile erection, fueling, and final checkout. It would also be necessary to provide for logistic support, electric power, crew housing, and other supporting functions for individual launchers or launching complexes. Much of the foregoing, including fuel storage, could be rail mounted and therefore require minimal local construction activity. However, the establishment of logistic support, construction of facilities on site, installation of equipment, and checkout of facilities and equipment by operating personnel would need to occur in sequence. Our estimates of the time involved in activating launchers assume a high degree of austerity, time compression, and efficiency in construction, installation, and checkout.

⁵⁵ The Assistant Chief of Staff for Intelligence, Department of the Army, believes that, for an ICBM system employing nonstorable liquid fuel and radio-inertial guidance, the construction time for soft launching facilities would be more nearly from 18 to 28 months depending on technical, labor, and material considerations as well as such factors as location and terrain. As experience is gained the construction time should approach the lower limit of 18 months. However, if a large number of launching facilities is to be constructed simultaneously, the experienced technical and labor forces and the required specialized equipment probably would be dissipated to a point where the construction time would return to the higher limits.

15. In programs "A" and "B," assuming an average lead time of one year, some 80-100 launchers would have had to be under construction simultaneously at the beginning of 1960. By the end of 1960, program "A" would require the simultaneous construction of some 120 launchers, while program "B" would require well over 200. In program "C," because the planned buildup in operational launchers is deferred until IOC date, only a few would have been under construction at the beginning of 1960; by the end of 1960 program "C" would require the simultaneous construction of some 50-75 launchers.

Implications of Programs

16. Illustrative program "A" provides, in mid-1961, numbers of operational missiles and launchers slightly larger than those estimated in NIE 11-8-59 as the lower limit of the probable Soviet ICBM program; in mid-1963, illustrative program "A" approximates the middle of the range given in the previous estimate. The economic effort required for its accomplishment would depend to a considerable extent on the type of sites employed, since missiles themselves probably represent only about 10-15 percent of the initial costs of the system. If fixed hardened sites were employed, the cumulative initial and operating costs of program "A" to mid-1963 would probably be on the order of 7-8 billion dollars, or 30-35 billion rubles. The use of rail mobile equipment would probably require nearly as much effort, but soft sites could reduce costs by as much as 25 percent. In any case, this would be a vigorous program, but one which, in conjunction with other major military programs, could be carried out without appreciable hindrance to presently planned Soviet industrial and construction programs.

17. Illustrative program "B" provides, in mid-1961, numbers of operational missiles and launchers comparable to those previously estimated as the upper limit of the probable Soviet ICBM program. We continue to believe that this expanded program would introduce considerable, though not insurmountable, difficul-

ties.⁵⁶ These difficulties would not lie primarily in the added costs, but rather in the requirement to attain and properly coordinate high rates of missile production, launcher construction, and troop training early in the program. Beyond mid-1961, program "B" dif-

*The Assistant Chief of Staff for Intelligence, Department of the Army, and the Assistant Chief of Naval Operations for Intelligence, Department of the Navy, call attention to their footnotes to paragraph 37 of the main text.

fers from that in NIE 11-8-59; it illustrates the operational capability the USSR might achieve if a program designed to provide 200 ICBMs on launcher in mid-1961 were continued through the following two years.

18. Illustrative program "C" is considerably smaller than that estimated in NIE 11-8-59. There is no reason to believe that the Soviets would have difficulty in carrying out such a program.

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ANNEX C

ESTIMATED SOVIET LONG RANGE AIRCRAFT PERFORMANCE UNDER AN
OPTIMUM MISSION PROFILE

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ESTIMATED SOVIET LONG RANGE AIRCRAFT PERFORMANCE UNDER AN OPTIMUM MISSION PROFILE

(Calculated in accordance with US MIL-C-5011A Spe. Except that fuel reserves are reduced to permit a maximum 30 minutes loiter at Sea Level, and aircraft operate at altitudes permitting maximum radius range)

	BADGER	1960 BADGER	1958 BISON	1960 BISON	BEAR	MB 1961 ^b
<i>Combat Radius/Range (nm)</i>						
1. 25,000 lb. bombload.....	....	....	2,700/5,100	2,950/5,600	4,150/7,800	....
one refuel ^a.....	....	....	3,650/6,900	3,950/7,500	....	....
2. 10,000 lb. bombload.....	1,600/3,100	1,800/3,450	2,900/5,700	3,200/6,300	4,500/8,800	1,750/3,500 ^d
one refuel ^a	2,200/4,200	2,400/4,600	3,800/7,500	4,300/8,500	....	2,600/5,400 ^d
3. 3,300 lb. bombload.....	1,800/3,600	2,000/3,900	3,000/6,000	3,000/6,600	4,700/9,300	1,950/4,050 ^d
one refuel ^a	2,500/4,800	2,650/5,200	3,900/7,800	4,450/8,900	....	2,900/6,000 ^d
<i>Speed Altitude (kts/ft)</i>						
1. Maximum speed at optimum altitude (kts/ft)...	550/13,200	555/14,200	535/18,800	535/18,800	500/25,000	1,150/35,000
2. Target speed/target altitude (kts/ft)*.....	475/40,800	475/42,300	460/42,700	460/43,400	435/41,600	1,150/53,000
<i>Combat Ceiling (ft)*.....</i>	45,400	46,700	45,900	46,500	42,000	56,000
<i>Terminal Target Altitude (ft)¹</i>						
1. 25,000 lb. bombload.....	....	....	53,900	54,200	47,200	....
2. 10,000 lb. bombload.....	50,000	52,500	55,400	55,800	48,000	59,800
3. 3,300 lb. bombload.....	51,500	54,300	56,100	56,500	48,700	60,500

^a Refueling estimates based upon use of compatible tankers which provide approximately 35 percent increase in radius/range.

^b To replace a limited number of BADGERs.

^c Capable of delivering AS-1, AS-2, and AS-3. See NIE 11-5-60.

^d Includes 500 nm "dash" at Mach 1.5-2.0.

^e For 10,000 lb. bombload.

^f Service ceiling at maximum power with one hour fuel reserves plus bombload abroad. No range figure is associated with this altitude.

NOTE: Improvements of BISON and BADGER aircraft are based on normal expected improvements in the engines through the 1960 period. The Assistant Chief of Staff, Intelligence, USAF, believes that subsonic, nuclear powered bomber could become operational by mid-1964.

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